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MONTANA GIS NEWS

The Newsletter of the
Montana GIS Users' Group

Summer 1998
STATE DOCUMENTS COLLECTION

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GIS Educates a Community for Long-Range Planning

By Allen Armstrong

Approximately 4 miles west of the Bozeman City limits lies a community locals refer to as Four Corners, a community centered around the intersecting roads that direct travelers to Big Sky, Belgrade, Norris and Bozeman. Four Corners is one of Gallatin County's fastest-growing communities. Unmanaged growth can significantly diminish the quality of life residents come to the Last Best Place to enjoy. With development will come more residential, commercial and industrial users, increasing the risk of potential groundwater contamination from septic systems and industrial accidents. If trends are not addressed, they will persist until the number of strategies and alternatives for the future of the community are significantly limited due to the immediacy of solving a public health and safety issue.

The trend in Four Corners appears to be for a variety of residential, commercial and industrial developments on small lots with individual wells and septic systems. Failure of septic systems and industrial accidents can contaminate individual wells and groundwater. Groundwater contamination presents a serious health threat to those using well water downstream from the source. It is the responsibility of the Gallatin County Planning Board to evaluate these growing concerns and develop a plan to serve the future needs of the Four Corners area.

In 1996 the Gallatin County Planning Board initiated the Four Corners Area Assessment with the Assessment given the Board's highest priority. Goals of the Assessment were defined as the following: GIS Data Collection; Community Open House; Community Planning Workshop; Establishment of a Community Planning Advisory Committee.

GIS Data Collection

Since the initiation of the Four Corners Area Assessment, Gallatin County and the Gallatin County Planning Board have been compiling GIS data for the Four Corners area focusing on land use and physical constraints.

(Educates Continued on Page 2)

Montana's Partnership in the National Spatial Data Infrastructure (NSDI)

By Michael Sweet, 1998/1999 Chair of the Montana Interagency GIS Technical Working Group (TWG)

In 1994 the Federal Geographic Data Committee (FGDC) initiated the Cooperating Groups Partnership Program. The program recognizes statewide or regional councils or committees committed to improving geographic data coordination. From the perspective of FGDC, the Partnership Program builds a network of communication and support which facilitates the "from the ground up" implementation of a National Spatial Data Infrastructure (NSDI). In 1996 The Montana Interagency GIS Technical Working Group (TWG) applied to the FGDC Partnership Program, and FGDC accepted TWG as a cooperating partner. The FGDC provides seed money through three FGDC Partnership Funding Programs: the Cooperative Agreements Program (CAP), the Framework Demonstration Projects Program (FDPP), and the NSDI Benefits Program (Benefits). The goal of these programs include establishing forums for communication, facilitating access to data, building framework and thematic data sets, developing educational and training programs, and fostering partnerships for data production and sharing.

The Federal Geographic Data Committee supports cooperation among all parties with a stake in the
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Data collection consisted of generating the base information on the site-specific area to be used in analysis and presented to the public in a meaningful and organized fashion. Very little information actually existed for this area in Gallatin County; therefore, the remainder needed produced for the analysis. Data sources consisted of State and local databases, actual field surveys and GPS field data. GIS Data themes consisted of the following: Existing Land Use; Parcel Data; Pollution Sources; School Districts; Projected Land Use; Groundwater Contours; Soils; Transportation Systems; Floodplains; Water Wells; Fire Districts; Public Land Survey System; Hydrography

Community Open House

A Four Corners community "Open House" was organized during a weekday evening as an informal setting to allow one-to-one exchanges between citizens, public officials and professionals. An art-like display of specific Four Corners GIS maps with self-explanatory information was designed to inform the attendees of current and projected conditions. Data was also available to the public through an ArcView project for interaction and queries. The Open House was attended by over 100 residents of the community, which made the statement to the Gallatin County Planning Board that further planning efforts are appropriate. Most residents left with a greater understanding of the problems that face them. All County Departments represented at the Open House made sure all questions were answered.

Community Planning Workshop

The next step was to arrange a more direct meeting of the residents to develop a shared vision of the future. This meeting was held on a Saturday and attended by over 60 concerned citizens. GIS presentations were again a significant part of this meeting, which was steered towards pinning down the key citizens that will continue forward with a community plan.

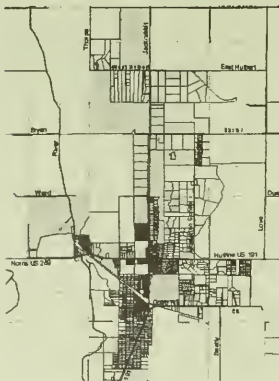
A community plan is a long-range guide for growth and development. It typically includes inventory and analysis leading to recommendations for the community's future development. Upon completion of a community plan, the Gallatin County Planning Board can forward a recommendation for adoption as an addition to the Gallatin County Plan to the County Commission.

Community Planning Advisory Committee

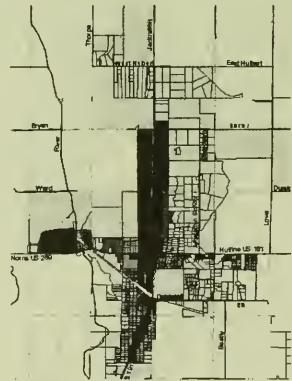
This is where the current process is presently. An Advisory Committee was developed from the Community Planning Workshop, which was citizen established and Planning Board approved. The Advisory Committee is tasked with developing a Four Corners Community Land Use Policy Plan. The Plan will represent what the residents want and be a statement of

community policy - a long-range guide for growth and development. The mission of the Committee is to present community recommendations on land use policy to the Gallatin County Planning Board. With informed consent of the community, the Plan may be adopted as part of the Gallatin County Plan established June 1, 1993. This Plan is a community-driven plan and not directed by the Gallatin County Planning Board or the Planning Department.

Even though the Four Corners area has considerable work ahead to implement a Community Land Use Policy Plan, the members of the Advisory Committee are substantially closer to managing their community. GIS played a vital role in presenting clear and educational information to the residents.



Four Corners Existing



Four Corners Projected

Gallatin County looks to continue making geographic information available to County residents through similar public gatherings in the future where citizen involvement and long-range planning is critical. Additional means of disseminating GIS data to residents of the County has been successfully accomplished through use of a County Internet Home Page. Informed citizens making intelligent decisions is part of Gallatin County Strategic Implementation Plan for integration - integration of data, disciplines, networks, and user communities into a coherent and expansive GIS environment that is beneficial for all types of users. ♦

(NSDI Continued from page 1)

development and use of geospatial data. Cooperating groups, formed on the basis of policies and procedures that enable all parties to participate in and contribute to the NSDI in those areas of their strength and expertise, are considered to be effective and cost efficient mechanisms for the establishment of the infrastructure. Twenty-six states now have coordinating groups recognized by FGDC in the Partnership Program. Montana should be proud that the FGDC staff often acknowledges Montana's contribution to the NSDI effort. The FGDC is directed by a Steering Committee of high-level officials representing almost every federal agency. Information on the structure of FGDC and the programs that they sponsor can be found on the FGDC website at <http://www/fgdc.gov>.

On June 18 and 19, FGDC sponsored a Partnership Meeting in Washington, D.C.. Twenty-six states were represented as well as the National Association of Counties, the League of Cities and Towns, and the National States Geographic Information Council. The purpose of the meeting was to share information, discuss issues of mutual interest to FGDC and the States, and prepare a presentation to the FGDC Steering Committee chaired by Secretary of Interior Bruce Babbitt. The minutes of the June 19 FGDC Steering Committee meeting are posted at

<http://www.fgdc.gov/Org/Steer/steer061998.html>.

These minutes reflect the issues discussed in the June 18 meeting and brought forward to the Steering Committee by the Partnership representatives. A standard agenda item is to have state representatives and the Steering Committee approve new FGDC standards that apply to all federal agencies. Version 2.0 of the Content Standard for Metadata and the Geospatial Positioning Accuracy Standards were officially adopted at this meeting. The current status of all Standards activities can be found at <http://www.fgdc.gov/Standards/Status/Textstatus.html>.

The bulk of the two-day discussion had to do with three major topics; Federal FY2000 budgets and NSDI, status of NSDI implementation by federal agencies, and the NSDI Demonstration Project. The FY2000 discussion focused on various legislative mechanisms that are available to assist federal agencies in allocating existing resources to NSDI implementation. The federal Government Performance Results Act was recognized as one vehicle for providing recognition and accountability for NSDI initiatives within federal agencies. It was the expressed opinion of most state representatives present that for the most part federal agencies have not made sufficient progress in implementing NSDI. In fact, most states are far more advanced in their implementation of NSDI than federal agencies within their state. The FGDC Steering Committee will seek ways to advance NSDI within federal

agencies. This issue will be a key focus of the Partnership Meeting in December 1998. The discussion on NSDI Demonstration Projects was an outgrowth of a recognized effort within Congress to tie more federal programs to community-based problem solving. In fact, there is an effort to tie future funding of some federal programs to the ability of that agency to show a documented and quantifiable link to community-based problems. In the view of Congress, this means expenditure must have a city, county or watershed council focus. In that light, the FGDC is promoting the NSDI Demonstration Project which seeks to identify existing examples of improved community management and decision making through the integration of geospatial data and infrastructure. The FGDC has already selected three demonstration areas and others will be added in the future. The GIS community in Montana should be proud that Gallatin County, Montana has been identified as one of three national examples for the NSDI Demonstration Project.

Information on the FGDC Partnership Meeting was presented at the August 6 MGIC Meeting in Helena and will be presented at the September 9 TWG Meeting in Bozeman. ♦

Quarterly Meeting of the TWG

by Michael Sweet

The Montana Interagency GIS Technical Working Group (TWG) will hold its quarterly meeting on September 9 from 10 am to 4 pm in Room 214 of the Federal Building in Bozeman. USDA-NRCS is hosting the meeting. Agenda items include reports on the FGDC Partnership Meeting; MGIC; status of the ownership, hydrography, transportation geographic databases; status of GAP, discussion on new members and revision of the MOU; discussion of framework and standards issues; and a host of other lively topics. A full agenda will be posted at <http://www.forestry.umn.edu/gis/twg/> sometime around mid-August along with pre-meeting materials. I will be personally contacting all TWG representatives before mid-August to obtain feedback and agenda items, but TWG representatives should feel free to contact me at any time to propose an agenda item. For those curious about the status of the meeting on Hydrography, a decision will be made sometime in the next few days. ♦

K-12 GIS Resources

By Margie Lubinski

In 1996, the Montana GIS Users' Group awarded a \$1000 grant to a group of teachers to develop a "**Virtual GIS Toolbox**" on the web. The idea was to research existing GIS training materials and resources that already existed on the web and organize them to provide a site for K-12 Educators to easily find GIS data and classroom examples to incorporate into their own curriculums. A group of teachers from Corvallis High School received the grant and the site is now up and running and can be found at: <http://www.corvallis.k12.mt.us/gis/default.htm>

In 1997, the Users' Group wanted to continue to provide GIS materials to the K-12 community and awarded another \$1000 grant to develop curriculum to be used in a "**Physical GIS Toolbox**". This toolbox consists of software, tools and workbooks that can be sent to schools for teachers to apply GIS concepts in their curriculum. A group of teachers from the Billings area developed a lesson plan entitled "Exploring the Lewis and Clark Expedition with GIS" and it is now a part of the "Physical Toolbox". We would like to thank everyone who donated software, workbooks and tools such as GPS units, compasses and maps that have helped get the toolbox started. It will be ready to distribute beginning September 1998. Our hope is to have GIS Professionals in communities throughout the state willing to aid K-12 classrooms in understanding geographic concepts through the tools available in the box. If you are interested in being this GIS Resource in your community, please contact Maargie Lubinski at Lubinski_Marjorie_G/r1_lolo@fs.fed.us or (406) 329-4743. For more information on the toolbox and request forms, please contact Ed Madej at: emadej@nris.state.mt.us or call (406) 444-0835 ♦



K-12 GIS School Data Available on-line from the Office of Public Instruction

by Catherine Love

The Office of Public Instruction (OPI) will be placing ArcView 3.0a shapefiles of school district data on its web page early this fall. OPI received the ArcView software from ESRI this spring and has been working to create tables of fiscal and non-fiscal data that will link to the geographic boundaries of Montana school districts.

OPI assigns each school district a Legal Entity code (LE). The LE code is the unique identifier of school districts used in all major OPI data collections. The LE code links school district boundary spatial data to OPI fiscal data such as property tax values and school general fund budgets. The LE code also links to non-fiscal data such as school size category, enrollment and dropout rates. K-12 GIS users may find these tables to be useful in teaching students the basics of GIS.

School districts are also assigned a unique CensusId code. OPI works with the U.S. Census Bureau to map school district territory boundaries. Accurate mapping is important because the Census Bureau and the National Center for Education Statistics (NCES) tabulate income data to determine school district eligibility for Title I funds. In the future, OPI hopes to make census data tabulated by school district available on the web.

The spatial data for the school district territories that will be available on OPI's web page is data from the 1992 U.S. Census Bureau TIGER files that were updated by OPI with school consolidations up through July of 1997.

OPI hopes to have the shapefiles up on their web page by the start of the school year. Look for the data tables at <http://www.opi@mt.gov>. For more information contact Catherine Love at (406) 444-1641. ♦



K-12 Toolbox Ready for Fall Distribution

By Mike Frankovich

The Montana GIS Users' Group K-12 sub-committee has decided that the "Physical GIS Toolbox" is complete enough to be made available to schools this fall.

The following items are currently available in the toolbox:

- 2 Global Positioning System(GPS) receivers
- GPS Slide presentation
- 2 books on GPS and DGPS
- Nexus class kit with 24 compasses and an instructor's overhead compass
- Written instructions on using a compass
- Working with Maps - curriculum for K-12 with instructions on using 7 1/2' Quadrangle maps
- Bitterroot Watershed Non Point Source Workbook and CD
- Montana ArcView shapefiles on CD with ArcExplorer
- Exploring the Lewis and Clark Expedition with GIS - lesson plan and CD
- GIS Basic Concepts - writeup
- Treasure Hunt ArcView game - CD with write-up
- Greater Yellowstone Area Data Clearinghouse - CD
- Aerial photos and 7 1/2' Quadrangle maps
- Activities from Public Night with write-up on each
- Virtual tour of Washington - CD (Mac-based)

Many of these items were donated and we wish to thank everyone for their generosity. Without them, the "Physical GIS Toolbox" would still be an idea only! The following is a list of participants and/or contributors to the Montana GIS Users' Group K-12 Education program and this Toolbox:

College of Technology, Butte, MT
 Geodata Services, Inc., Missoula, MT
 Montana State University GIAC,
 Bozeman, MT
 Montana State Library NRIS, Helena,
 MT
 Mountain Research Center, Bozeman,
 MT
 USDA Forest Service, Bozeman and
 Missoula, MT
 USGS, Denver, CO

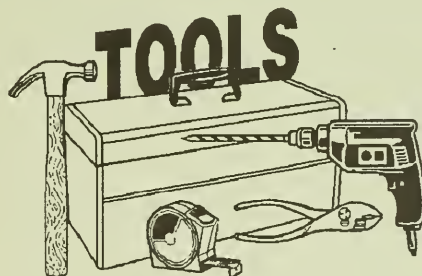
We also have a wish list for the toolbox:

- The Atlas of the New West published by University of Colorado at Boulder
- National Geographic Atlas of the World
- A new CD ROM based Atlas
- Basic GIS Literature
- ArcView CD Demos
- Scales for determining coordinates from a 7 1/2' Quad.

If you would like to donate items to the toolbox or if you have any questions or would like a request form, please contact Ed Madej at: emadej@nr.is.state.mt.us or call (406) 444-0835. The toolbox will be housed at the Montana State Library.

We would also like to include a list of local GIS professionals in the toolbox so that teachers have someone they can contact if they have any questions or need a hand. If you would like to be on this list, please contact Margie Lubinski at: mlubinsk/r1_lolo@fs.fed.us or call (406) 329-3743.

As teachers become familiar with the toolbox we would urge them to create curriculum which can be used in the future. The application of this toolbox will ultimately rest with K-12 teachers so curriculum coming from them will be most beneficial to all. ♦



The OpenGIS Consortium and OpenGIS

By Kirsten Schmidt, University of Montana

With the ever-increasing production of digital geospatial data, more and more users are seeking access to this abundance of data. With growing pressure on government agencies and businesses alike to operate more efficiently and economically, sharing of these data is becoming more common. Because many methods of acquiring and using spatial data have been developed, often independently from one another, data are often incompatible, making data-sharing a frustrating and expensive process. Data conversion by governments in the United States alone cost upwards of \$4 billion annually (Buehler and McKee, 1998)¹. In 1994, the OpenGIS Consortium, Inc. (OGC), a non-profit, international trade association made up of software and computer vendors, system integrators, telecommunication companies, universities, and federal agencies, was founded to address data-sharing problems and provide a formal structure for the development of data-sharing software specifications.

What are some of these data sharing problems? One is the data transfer problem. Different organizations using different GIS platforms produce and use different digital data formats, often resulting in cumbersome and time-consuming conversions when data are shared. In addition to the high cost of transferring data among different systems, information is often lost in the translation process. Another problem is compatibility of sampling methods and standards. In order for a user to effectively incorporate data produced by other organizations, all methods and standards of the source data need to be made available to determine if the data are compatible. Yet another problem is that of data documentation. Do agencies or institutions providing spatial data also provide and maintain metadata? Does this metadata comply with accepted standards?

One of the goals of the OGC is to develop software specifications that provide a framework to computer developers for the sharing of digital geographic data across multiple platforms or what OGC calls "interoperable geoprocessing". The OpenGIS specifications will be independent of software, hardware platforms, and networks. The term 'OpenGIS' is defined by OGC as seamless access to various digital geographic data and computer processing of the geographic data in a networked environment. 'OpenGIS' is a trademark of OGC to be used by vendors on products that meet OpenGIS interface specifications. Heterogeneous geographic data will be available across various distribution environments such as the Internet, and the data conversions will be transparent to the user. While the integration of heterogeneous methods and data standards may not always be achievable, part of the OpenGIS Specification, the OpenGIS Services Architecture, will incorporate services to track data lineage and quality. The OpenGIS Services Architecture will not include developed metadata standards, but will probably include standard approaches to representing, translating, and searching metadata.

With so many sources of geographic spatial data coming online and the increasing number of users, OpenGIS provides a model through which quick and easy access to all forms of spatial data and geoprocessing will become a reality.

For more information on the OpenGIS Project, see the their web site at <http://www.opengis.org/>.

¹Buehler, Kurt; McKee, Lance, editors. 1998. The OpenGIS Guide: Introduction to Interoperable Geoprocessing and the OpenGIS Specification.

MT GIS Users Group Activity Update

by Michael Sweet

The next MT GIS Users Group Conference will be held in Idaho Falls, ID., tentatively scheduled for April 19 - 21, 1999. This is the first year it will be in Idaho since the two states decided to try merging their conferences. It should be an excellent conference and we're hoping for a good turnout from Montana. This will be the end of the trial period established for bringing the conferences together, after which we need to vote as a Users Group on whether or not we officially merge. Therefore it is very important we have good attendance from the Montana GIS Users Group in order to make an informed decision. Please keep in mind the merge affects only the conference, not the Users Groups from each state.

As a result of our not having the conference in Montana next year, the MT GIS Users Group Board would like to sponsor several workshops during the year. We would like to poll the GIS community as to what kind of workshops, training or seminars you'd be interested in. We have set up a website to keep track of ideas/requests and this can be found at:

<http://www.forestry.umd.edu/gis/mtgis/>

There are some workshop suggestions already listed at the site and we welcome any new ones. Michael Sweet will be maintaining this site and has some suggestions for submitting your ideas: A Title; Time frame; Cost range for course (min/max); Brief paragraph describing the objective of the training/workshop; Web-links (URLs) to additional information on this topic; Suggested contact person for leading the course; and contact for who submitted this idea (in case further information is needed) Contacts should list name, address, phone, and email if available.

If you just have a suggestion but no other information to provide, send it on and if there's enough interest, we'll try and put it together. These opportunities could also be sponsored jointly with other groups in the state such as TWG, MLGGC and MGIC. We can't do them all, though, so we'll need to prioritize. Please respond to Michael Sweet by Sept 1 at: sweet@forestry.umd.edu with both your ideas as well as which ones you would be most interested in taking so we can put together a program for the 1998-1999 year. The workshops and training will be determined by the GIS community so we need your input. Hope to see you in Idaho Falls!♦

Automated Mapping Montana Style

by Stu Kirkpatrick

In the last three years there has been speculation that much of Montana's land ownership, both public and private, could be mapped using an automated set of tools. These tools would use legal land descriptions from MT. Department of Revenue's (DOR) CAMA (computer assisted mass appraisal) database and some breakdown of the Montana Public Land Survey System (PLSS). The program would divide sections of the PLSS into what is known as aliquot parts. For example, a legal land description of NNE, Section 30, Township 23 North Range 44 East, would become a parcel defined by the PLSS lines delineating the north half of the northeast quarter of Section 30, Township 23 North Range 44 East. No manual or computer drafting would be required. A DOR parcel identification number (geocode) would automatically be assigned. This type of program would be most useful to map land ownership in eastern and central Montana, but to a certain extent could be used in every county to map simple aliquot parcels in a very cost-effective manner.

Early efforts by Steve Hellenenthal of Yellowstone County, and Craig Bacino from DNRC seemed promising. One thing the earlier efforts lacked however was a digital breakdown of the PLSS in anything smaller than sections. This resulted in simply dividing the section lines in half, creating quarter sections, breaking the quarter section lines in half to create quarter quarter sections, etc. This methodology did not reflect the original and subsequent surveys that subdivided sections of land. A section of land almost never was divided perfectly, with lines being split mathematically in half.

After the 1997 Montana/Idaho GIS conference where he attended a workshop on the BLM's Geographic Coordinate Database (GCDB), Craig Bacino started altering his automated programs to use GCDB. The Montana Department of Administration's Information Services Division (ISD), through the Montana Cadastral Mapping Program, hired Bacino in September 1997 to build a menu driven automated mapping program. He has pieced together data from GCDB, CAMA and BLM's 1:100,000 scale ownership into a series of modules that allow the user to download GCDB, create and edit private land ownership, incorporate public land into a single digital ownership database, and output checkplots for quality control and final parcel research.

These programs have been refined in a pilot project in Garfield County. Initial mapping took approximately three weeks to cover 150 townships and completed 80 to 90 percent of the total parcels in the county. After a visit to Jordan, we estimated that a properly trained cartographer, well versed in property research, could clean up most of the rest of the parcels in approximately one month. Areas of conflicting legal descriptions may take longer to resolve, however well less than one percent of the county's parcels would fall into that category. We also estimated that this type of parcel automation could be done at a cost of 25 cents a parcel vs. an average consultant's charge of five dollars per parcel.

The code is still undergoing final revisions at this time, but soon will go into production, producing digital parcel ownership for many Montana counties. For further information, contact Stu Kirkpatrick at 406-444-9013.♦

GIS Conferences

September 12-17, National States Geographic Information Council Eighth Annual Meeting, Annapolis, MD, Contact: 603-643-1600.

September 28-30, GIS for the Oil and Gas Industry Conference and Exhibition, Houston, TX, Contact: 303-337-0513.

October 5-7, 13th Annual Northwest ESRI User's Group Conference, Sun Valley, ID, Contact: tmorse@idwr.state.id.us

April 19-21, MT/ID GIS User's Group Conference, Idaho Falls, ID, Contact: <http://www.forestry.umt.edu/gis/mtgis/>

GIS Training

The following classes are being offered through ESRI Inc., Contact: ESRI Learning Center, 380 New York St, Redlands, CA 92373-8100 909-793-2853 x1-1585

Accessing SDE with Avenue

Accessing SDE with C

Advanced ARC/INFO

ARC/INFO Database Design

ArcStorm Database Management Seminar

Customizing ARC/INFO with AML

Implementing MapObjects Internet Map Server Technologies

Introduction to: ARC/INFO, ArcCAD, ArcView GIS, Atlas GIS, Avenue

Managing a GIS

Mastering ArcView GIS

Programming with Avenue

Programming MapObjects with Visual Basic

SDE Administration

Using ARC/GRID with ARC/INFO

Using ARC/INFO ODE with Visual Basic

Using ARC NETWORK

Using ARC TIN

Working with ArcView Image Analysis Extension

Working with ArcView Spatial Analyst

The following classes are being offered through GeoData Solutions Inc, Contact: Karen Micklas, 8620 Wolff Ct., Suite 250, Westminster, CO 80030, 303-650-1600

Smallworld GIS Developer Training.

The following classes are being offered through Scientific Technologies Corp, Contact: Bill Timmins, 4400 E. Broadway, Suite 705, Tucson, AZ, 85711 520-325-3185.

Customizing ArcView with Avenue

GPS/GIS Integration

Introduction to ArcView

The following classes are being offered through US Geological Survey and University of Southwestern Louisiana. Contact: University of Southwestern Louisiana, National Wetlands Research Center, 700 Cajundome Blvd., Lafayette, LA 70506-3154 318-266-8500

Advanced Wetland Photo Interpretation,

Introduction to Desktop GIS (ArcView) for Natural Resources

Introduction to GIS (ARC/INFO) for Natural Resources,

Introduction to Wetland Remote Sensing and Mapping

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Natural Resource Information System
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